

Amendments to the Claims

Pursuant to 37 C.F.R § 1.121(c), Applicant wishes to amend the claims. This Listing of Claims will replace all prior versions, and listings, of claims in the subject application.

Listing of Claims

1. – 27. (Canceled)

28. (Currently Amended) ~~The A~~ method of manufacturing electronic circuits comprising:
~~according to claim 27~~
generating CAD data, a bill of materials and an approved component vendor list for an
electronic circuit; and
employing said CAD data, said bill of materials and said approved component vendor list for
automatically generating:
a pick & place machine-specific component loading specification;
a pick & place machine-specific component placement sequence; and
pick & place machine-specific component data for governing the operation of at least
one specific pick & place machine in a manufacturing line, said employing said CAD data,
said bill of materials and said approved component vendor list for automatically generating
pick & place machine specific component data for governing the operation of at least one
specific pick & place machine including automatically generating said pick & place machine-
specific component data by employing a first database containing pick & place machine-
independent, geometric component data and a second database containing machine-specific,

component manufacturer-independent rules for generating said pick & place machine-specific component data, wherein:

said first database also contains pick & place machine-independent,

component supply data:

said employing said CAD data, said bill of materials and said approved component vendor list for automatically generating pick & place machine-specific component loading specification, pick & place machine-specific component placement sequence and pick & place machine-specific component data for governing the operation of at least one specific pick & place machine in a manufacturing line comprises:

employing said CAD data, said bill of materials, said approved component vendor list and said first database to search for component data for new components; and

employing said first database and said second database to auto-generate said pick & place machine specific component data;

and wherein

said employing said CAD data, said bill of materials and said approved component vendor list for automatically generating pick & place machine-specific component loading specification, pick & place machine-specific component placement sequence and pick & place machine-specific component data for governing the operation of at least one specific pick & place machine in a manufacturing line also comprises:

prior to said employing said CAD data said bill of materials, said approved component vendor list and said first database to search for component data for new components, employing said CAD data, said bill of materials and said approved component vendor list to form combined printed circuit assembly data;

following said employing said first database and said second database, selecting a pick & place machine line;

thereafter, employing said combined printed circuit assembly data together with said pick & place machine specific component data to balance said pick & place machine line; and

thereafter, employing a computer to provide said pick & place machine-specific component loading specification, said pick & place machine-specific component placement sequence and said pick & place machine-specific component data for governing the operation of at least one specific pick & place machine in a manufacturing line to at least one pick & place machine in said pick & place machine line.

29. (Previously Presented) The method of manufacturing electronic circuits according to claim 28, and wherein said combined printed circuit assembly data employs PCN designations.

30. (Previously Presented) The method of manufacturing electronic circuits according to claim 28 and wherein said employing said CAD data, said bill of materials, said approved component vendor list and said first database to search for component data for new components

comprises employing said combined printed circuit assembly data and said first database to search for said component data for new components.

31. (Previously Presented) The method of manufacturing electronic circuits according to claim 30 and wherein said employing said combined printed circuit assembly data and said first database to search for component data for new components comprises:

searching said first database for pick & place machine independent component supply data for said new components; and

searching said first database for pick & place machine independent geometric component data for said new components.

32. (Previously Presented) The method of manufacturing electronic circuits according to claim 31 and wherein said searching said first database for pick & place machine independent component supply data for said new components comprises:

selecting at least one PCN corresponding to ones of said new components for which Component Supply Form (CSF) parameters are not available;

obtaining a CV/CAT# corresponding to said at least one PCN corresponding to ones of said new components for which CSF parameters are not available; and

employing said CV/CAT# to search at least part of said first database for corresponding CSF parameters.

33. (Previously Presented) The method of manufacturing electronic circuits according to claim 32 and also comprising employing said CV/CAT# to search at least part of said first database for corresponding default CSF parameters.

34. (Previously Presented) The method of manufacturing electronic circuits according to claim 32 and also comprising employing said at least one PCN to search at least part of said first database for at least one corresponding set of default CSF parameters.

35. (Previously Presented) The method of manufacturing electronic circuits according to claim 32 and also comprising:

presenting said at least one corresponding set of default CSF parameters and said at least one PCN to an operator for selection of an appropriate set of CSF parameters.

36. (Previously Presented) The method of manufacturing electronic circuits according to claim 35 and also comprising, following said presenting:

automatically adding said appropriate set of CSF parameters as CSF parameters to said first database for said at least one PCN; and

automatically adding said appropriate set of CSF parameters as default CSF parameters to said first database for CV/CAT#s corresponding to said at least one PCN.

37. (Previously Presented) The method of manufacturing electronic circuits according to claim 32 and also comprising:

providing manually generated CSF parameters for said at least one PCN;

automatically adding said manually generated CSF parameters to said first database for said at least one PCN; and

automatically adding said manually generated CSF parameters as default CSF parameters to said first database for CV/CAT#s corresponding to said at least one PCN.

38. (Previously Presented) The method of manufacturing electronic circuits according to claim 32 and wherein said selecting at least one PCN corresponding to ones of said new components for which CSF parameters are not available comprises selecting at least one PCN in said combined printed circuit assembly data which does not have CSF parameters.

39. (Previously Presented) The method of manufacturing electronic circuits according to claim 32 and wherein said selecting at least one PCN corresponding to ones of said new components for which CSF parameters are not available comprises selecting at least one PCN in said combined printed circuit assembly data for which there are no pick & place machine specific component supply parameters.

40. (Previously Presented) The method of manufacturing electronic circuits according to claim 31 and wherein said searching said first database for pick & place machine independent component supply data for said new components comprises:

selecting at least one PCN corresponding to ones of said new components for which Generic Component Geometric (GCG) parameters are not available;

obtaining a CV/CAT# corresponding to said at least one PCN corresponding to ones of said new components for which GCG parameters are not available; and

employing said CV/CAT# to search at least part of said first database for corresponding GCG parameters.

41. (Previously Presented) The method of manufacturing electronic circuits according to claim 40 and wherein said employing said CV/CAT# also comprises:

automatically adding said corresponding GCG parameters to said first database for said CV/CAT#; and

automatically adding said corresponding GCG parameters to said first database for other CV/CAT#s corresponding to said at least one PCN corresponding to ones of said new components for which GCG parameters are not available.

42. (Previously Presented) The method of manufacturing electronic circuits according to claim 40 and also comprising, following said employing said CV ICAT#, conducting a proximity search including:

searching said first database for at least one additional PCN having at least one corresponding CV/CAT#, which is different from said CV/CAT#, in common with said at least one PCN corresponding to ones of said new components for which GCG parameters are not available;

searching said first database for at least one different CV ICA T# corresponding to said at least one additional PCN, which does not correspond to said at least one PCN corresponding to ones of said new components for which GCG parameters are not available; and

employing said at least one different CV ICAT# to search at least part of said first database for GCG parameters corresponding to said at least one different CV/CAT#.

43. (Previously Presented) The method of manufacturing electronic circuits according to claim 42 and also comprising:

presenting said GCG parameters corresponding to said at least one different CV/CAT# and said at least one PCN corresponding to ones of said new components for which GCG parameters are not available to an operator for approval.

44. (Previously Presented) The method of manufacturing electronic circuits according to claim 43 and also comprising:

automatically adding said GCG parameters corresponding to said at least one different CV/CAT# to said first database as GCG parameters corresponding to CV/CAT#s corresponding to at least one of said at least one PCN corresponding to ones of said new components for which GCG parameters are not available and said at least one additional PCN; and

automatically indicating, for all CV/CAT#s corresponding to said at least one PCN corresponding to ones of said new components for which GCG parameters are not available, said GCG parameters as being obtained by said proximity search.

45. (Previously Presented) The method of manufacturing electronic circuits according to claim 40 and also comprising:

providing manually generated GCG parameters for said CV/CAT#;

automatically adding said manually generated GCG parameters to said first database for said CV/CAT#; and

automatically adding said manually generated GCG parameters to said first database for CV/CAT#s corresponding to said at least one PCN corresponding to ones of said new components for which GCG parameters are not available.

46. (Previously Presented) The method of manufacturing electronic circuits according to claim 40 and wherein said selecting at least one PCN corresponding to ones of said new components for which GCG parameters are not available comprises selecting at least one PCN in said combined printed circuit assembly data which does not have GCG parameters.

47. (Previously Presented) The method of manufacturing electronic circuits according to claim 40 and wherein said selecting at least one PCN corresponding to ones of said new components for which GCG parameters are not available comprises selecting at least one PCN in said combined printed circuit assembly data for which there are no pick & place machine specific component shape parameters.

48. (Previously Presented) The method of manufacturing electronic circuits according to claim 28 and wherein said employing said first database and said second database to auto-generate said pick & place machine specific component data comprises:

employing said pick & place machine independent component supply data and said machine-specific, component manufacturer-independent rules for generating said pick & place machine-specific component data to auto-generate pick & place machine specific component supply parameters; and

employing said pick & place machine independent geometric component data and said machine-specific, component manufacturer-independent rules for generating said pick & place machine-specific component data to auto-generate pick & place machine specific component shape parameters.

49. (Previously Presented) The method of manufacturing electronic circuits according to claim 48 and wherein said employing said pick & place machine independent component supply data comprises:

for a specific pick & place machine in said pick & place machine line, selecting at least one PCN in said combined printed circuit assembly data for which at least one of corresponding pick & place machine specific component supply parameters and a corresponding pick & place machine specific component supply identifier is not available;

employing at least one generic component supply identifier to obtain CSF parameters corresponding to said at least one PCN in said combined printed circuit assembly data for which at least one of corresponding pick & place machine specific component supply parameters and a corresponding pick & place machine specific component supply identifier is not available;

employing at least part of said CSF parameters to access appropriate ones of said machine-specific, component manufacturer-independent rules for generating said pick & place machine-specific component data;

operating said appropriate ones of said machine-specific, component manufacturer independent rules for generating said pick & place machine-specific component data based on at least one of said CSF parameters to yield corresponding values; and

assigning said corresponding values to corresponding ones of said pick & place machine-specific component supply parameters.

50. (Previously Presented) The method of manufacturing electronic circuits according to claim 49 and also comprising, prior to said employing at least part of said CSF parameters to

access appropriate ones of said machine-specific, component manufacturer-independent rules, employing at least part of said CSF parameters to auto-generate said corresponding pick & place machine specific component supply identifier.

51. (Previously Presented) The method of manufacturing electronic circuits according to claim 48 and wherein said employing said pick & place machine independent geometric component data comprises:

for a specific pick & place machine in said pick & place machine line, selecting at least one PCN in said combined printed circuit assembly data for which at least one of corresponding pick & place machine specific component shape parameters and a corresponding pick & place machine specific component shape identifier is not available;

employing at least one generic component shape identifier to obtain GCG parameters corresponding to said at least one PCN in said combined printed circuit assembly data for which at least one of corresponding pick & place machine specific component shape parameters and a corresponding pick & place machine specific component shape identifier is not available;

employing at least part of said GCG parameters to access appropriate ones of said machine-specific, component manufacturer-independent rules for generating said pick & place machine-specific component data;

operating said appropriate ones of said machine-specific, component manufacturer-independent rules for generating said pick & place machine-specific component data based on at least one of said GCG parameters to yield corresponding values; and

assigning said corresponding values to corresponding ones of said pick & place machine-specific component shape parameters.

52. (Previously Presented) The method of manufacturing electronic circuits according to claim 51 and also comprising, prior to said employing at least part of said GCG parameters to access appropriate ones of said machine-specific, component manufacturer-independent rules, employing at least part of said GCG parameters to auto-generate said corresponding pick & place machine specific component shape identifier.

53. – 55. (Canceled)

56. (Currently Amended) A method of manufacturing electronic circuits comprising:
~~according to claim 55~~

generating CAD data, a bill of materials and an approved component vendor list for an electronic circuit; and

employing said CAD data, said bill of materials and said approved component vendor list for automatically generating:

a pick & place machine-specific component loading specification;

a pick & place machine-specific component placement sequence; and

pick & place machine-specific component data for governing the operation of at least one specific pick & place machine in a manufacturing line, said employing said CAD data, said bill of materials and said approved component vendor list for automatically generating pick & place machine specific component data for governing the operation of at least one specific pick & place machine including automatically generating said pick & place machine-specific component data by employing a first database containing pick & place machine-

independent, geometric component data and a second database containing machine-specific, component manufacturer-independent rules for generating said pick & place machine-specific component data, wherein:

prior to said employing said CAD data, said bill of materials, said approved component vendor list and said first database, automatically populating a component vendor-specified component geometric parameters (CCL) portion of said first database; and

said first database also contains pick & place machine-independent, component supply data;

said employing said CAD data, said bill of materials and said approved component vendor list for automatically generating pick & place machine-specific component loading specification, pick & place machine-specific component placement sequence and pick & place machine-specific component data for governing the operation of at least one specific pick & place machine in a manufacturing line comprises:

employing said CAD data, said bill of materials, said approved component vendor list and said first database to search for component data for new components;
and

employing said first database and said second database to auto-generate said pick & place machine specific component data;

said automatically populating comprises employing a component library which maps CV/CAT#s to component packaging shape parameters;

said employing a component library comprises employing said component library which includes;

a first stage mapping which maps CV/CAT#s to component packaging shape
identifiers; and

a second stage mapping which maps said component packaging shape
identifiers to component packaging shape parameters;

said automatically populating comprises:

obtaining at least one CV/CAT# for which no mapping exists in said CCL
portion;

employing said first stage mapping to obtain a component packaging shape
identifier corresponding to said at least one CV/CAT#;

employing said second stage mapping to obtain component packaging shape
parameters corresponding to said component packaging shape identifier
corresponding to said at least one CV/CAT#;

employing said component packaging shape identifier corresponding to said
at least one CV/CAT# said component packaging shape parameters corresponding to
said component packaging shape identifier to provide an auto-generated generic
component shape identifier and auto-generated GCG parameters; and

adding said auto-generated generic component shape identifier and said auto-
generated GCG parameters to said CCL portion for said at least one CV/CAT#.

57. (Previously Presented) The method of manufacturing electronic circuits according to
claim 56 and wherein said automatically populating also comprises, prior to said adding:

employing said auto-generated generic component shape identifier to search said CCL
portion for corresponding, previously generated GCG parameters;

comparing said previously generated GCG parameters and said auto-generated GCG parameters; and

if discrepancies are found, modifying said auto-generated generic component shape identifier to provide a modified generic component shape identifier and adding said modified generic component shape identifier and said auto-generated GCG parameters to said CCL portion for said at least one CV ICAT#.

58. (Previously Presented) The method of manufacturing electronic circuits according to claim 28 and also comprising, following said employing said combined printed circuit assembly data together with said pick & place machine specific component data to balance said pick & place machine line, assigning suitable variables to adaptive ones of said pick & place machine specific component data to provide pick & place machine specific component data which corresponds to a specific pick & place machine configuration for at least one pick & place machine in said pick & place machine line.

59. – 119. (Canceled)

120. (Currently Amended) ~~The An~~ apparatus for manufacturing electronic circuits ~~comprising: according to claim 114 and wherein said computerized auto-generations functionality comprises:~~

~~a computerized electronic circuit data generator operative for generating CAD data, a bill of materials and an approved component vendor list for an electronic circuit; and~~

~~a computerized generator operative for employing said CAD data, said bill of materials and said approved component vendor list for automatically generating:~~

~~a pick & place machine-specific component loading specification;~~

~~a pick & place machine-specific component placement sequence; and~~

pick & place machine-specific component data for governing the operation of at least one specific pick & place machine in a manufacturing line, said computerized generator including:

a first database containing pick & place machine-independent, geometric component data and pick & place machine-independent, component supply data;

a second database containing machine-specific, component manufacturer-independent rules for generating said pick & place machine-specific component data;

computerized new component data searching functionality operative to employ said CAD data, said bill of materials, said approved component vendor list and said first database to search for component data for new components, including:

computerized component supply data searching functionality operative to search said first database for pick & place machine independent component supply data for said new components; and

computerized component shape data searching functionality operative to search said first database for pick & place machine independent geometric component data for said new components including:

a PCN selector operative to select at least one PCN corresponding to ones of said new components for which Generic Component Geometric (GCG) parameters are not available;

GCG CV ICAT# obtaining functionality operative to obtain a CV/CAT# corresponding to said at least one PCN corresponding to ones of said new components for which GCG parameters are not available; and

GCG searching functionality operative to employ said CV/CAT# to search at least part of said first database for corresponding GCG parameters;

first computerized searching functionality operative to search said first database for at least one additional PCN having at least one corresponding CV/CAT#, which is different from said CV/CAT#, in common with said at least one PCN corresponding to ones of said new components for which GCG parameters are not available;

second computerized searching functionality operative to search said first database for at least one different CV/CAT# corresponding to said at least one additional PCN, which does not correspond to said at least one PCN corresponding to ones of said new components for which GCG parameters are not available; and

proximate GCG parameter searching functionality operative to employ said at least one different CV ICAT# to search at least part of said first database for GCG parameters corresponding to said at least one different CV/CAT#;

computerized auto-generation functionality operative to employ said first database and said second database to auto-generate said pick & place machine specific component data; and

a computerized combined printed circuit assembly data generator operative to employ said CAD data, said bill of materials and said approved component vendor list to form combined printed circuit assembly data.

121. – 123. (Canceled)

124. (Currently Amended) ~~The An~~ apparatus for manufacturing electronic circuits according to claim 121 and wherein said component shape parameter auto-generation functionality comprises: comprising:

a computerized electronic circuit data generator operative for generating CAD data, a bill of materials and an approved component vendor list for an electronic circuit; and

a computerized generator operative for employing said CAD data, said bill of materials and said approved component vendor list for automatically generating:

a pick & place machine-specific component loading specification;

a pick & place machine-specific component placement sequence; and

pick & place machine-specific component data for governing the operation of at least one specific pick & place machine in a manufacturing line, said computerized generator including:

a first database containing pick & place machine-independent, geometric component data and pick & place machine-independent, component supply data;

a second database containing machine-specific, component manufacturer-independent rules for generating said pick & place machine-specific component data;

computerized new component data searching functionality operative to employ said CAD data, said bill of materials, said approved component vendor list and said first database to search for component data for new components, including:

computerized auto-generation functionality operative to employ said first database and said second database to auto-generate said pick & place machine specific component data, including:

component supply parameter auto-generation functionality operative to employ said first database and said second database to auto-generate pick & place machine specific component supply parameters; and

component shape parameter auto-generation functionality operative to employ said first database and said second database to

auto-generate pick & place machine specific component shape parameters; and
a computerized combined printed circuit assembly data generator operative to employ said CAD data, said bill of materials and said approved component vendor list to form combined printed circuit assembly data; and wherein:
said component shape parameter auto-generation functionality comprises:

a PCN selector operative, for a specific pick & place machine in said pick & place machine line, to select at least one PCN in said combined printed circuit assembly data for which at least one of corresponding pick & place machine specific component shape parameters and a corresponding pick & place machine specific component shape identifier is not available;

GCG parameter obtaining functionality operative to employ at least one generic component shape identifier to obtain GCG parameters corresponding to said at least one PCN in said combined printed circuit assembly data for which at least one of corresponding pick & place machine specific component shape parameters and a corresponding pick & place machine specific component shape identifier is not available;

rules operating functionality operative to employ at least part of said GCG parameters to access appropriate ones of said machine-specific, component manufacturer-independent rules for generating said pick & place machine-specific component data and to operate said appropriate ones of said machine-specific, component manufacturer-independent rules for generating said pick & place machine-specific component data based on at least one of said GCG parameters to yield corresponding values; and

value assigning functionality operative to assign said corresponding values to corresponding ones of said pick & place machine-specific component shape parameters.

125. (Previously Presented) The apparatus for manufacturing electronic circuits according to claim 124 and wherein said component shape parameter auto-generation functionality also comprises component shape identifier auto-generation functionality operative

to employ at least part of said GCG parameters to auto-generate said corresponding pick & place machine specific component shape identifier.

126 – 128. (Canceled)

129. (Currently Amended) ~~The~~ An apparatus for manufacturing electronic circuits according to claim 128 and wherein said computerized database populating functionality comprises: comprising:

a computerized electronic circuit data generator operative for generating CAD data, a bill of materials and an approved component vendor list for an electronic circuit; and

a computerized generator operative for employing said CAD data, said bill of materials and said approved component vendor list for automatically generating:

a pick & place machine-specific component loading specification;

a pick & place machine-specific component placement sequence; and

pick & place machine-specific component data for governing the operation of at least one specific pick & place machine in a manufacturing line, said computerized generator including:

a first database containing pick & place machine-independent, geometric component data and pick & place machine-independent, component supply data;

a second database containing machine-specific, component manufacturer-independent rules for generating said pick & place machine-specific component data;

computerized new component data searching functionality operative to employ said CAD data, said bill of materials, said approved component vendor list and said first database to search for component data for new components, including computerized auto-generation functionality operative to employ said first database and said second database to auto-generate said pick & place machine specific component data;

a computerized combined printed circuit assembly data generator operative to employ said CAD data, said bill of materials and said approved component vendor list to form combined printed circuit assembly data; and

a computerized database populating functionality operative to automatically populate a CCL portion of said first database, wherein:

said computerized database populating functionality also comprises component library which maps CV/CAT#s to component packaging shape parameters;

said component library comprises a first stage mapping which maps CV ICA T#s to component packaging shape identifiers and a second stage mapping which maps said component packaging shape identifiers to component packaging shape parameters; and

said computerized database populating functionality comprises:

CCL CV/CAT# obtaining functionality operative to obtain at least one CV/CAT# for which no mapping exists in said CCL portion;

component packaging shape identifier obtaining functionality operative to employ said first stage mapping to obtain a component packaging shape identifier corresponding to said at least one CV ICA T#; and

component packaging shape parameter obtaining functionality operative to employ said second stage mapping to obtain component packaging shape parameters corresponding to said component packaging shape identifier corresponding to said at least one CV/CAT#.

130. 149. (Canceled)